Random Variables Checkpoint 3

These two questions refer to the following information:

Color-blindness is any abnormality of the color vision system that causes a person to see colors differently than most people, or to have difficulty distinguishing among certain colors (www.visionrx.com).

Color-blindness is gender-based, with the majority of sufferers being males.

Roughly 8% of white males have some form of colorblindness, while the incidence among white females is only 1%.

A random sample of 20 white males and 40 white females was chosen.

Let **X** be the number of males (out of the 20) who are color-blind.

Let Y be the number of females (out of the 40) who are color-blind.

Let Z be the total number of color-blind individuals in the sample (males and females together).

Which of the following is true about the random variables X,

Question (1)

Y, and Z?

A: X is binomial with n = 20 and p = .08. Y is binomial with n = 40 and p = .01.

Y is binomial with n = 40 and p = .01.Z is not binomial.

D: All of the above are true.

E: Only (A) and (B) are true.

Feedback

A : 0

This is not quite right. Although this statement is true, there is a better option available. Consider the remaining options. (D) is the right answer.

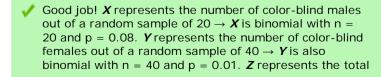
B:0

This is not quite right. Although this statement is true, there is a better option available. Consider the remaining options. (D) is the right answer.

C:O

This is not quite right. Although this statement is true, there is a better option available. Consider the remaining options. (D) is the right answer.

D: 10



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number of color-blind people out of the total sample of 60. **Z** is not binomial, since the probability of "success" (being color-blind) is not the same for all 60 people (0.08 for the 20 males and 0.01 for the 40 females).

E:0

X This is not guite right. Although (A) and (B) are true, they are not the only true statements of all the options. Z cannot be binomial, because the probability of "success" (being color-blind) is not the same for each trial. There are 20 males with a probability of success of 0.08 and there are 40 females with a probability of success of 0.01. Consider the remaining options. (D) is the right answer.

Question (2)

What is the probability that exactly 2 of the 20 males are color-

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A: .08

B: 2711

C: .0143 D: .5422

E: .0159

Feedback

A:0

X This is not quite right. From the previous question, you know that if **X** is a random variable representing the number of color-blind white males out of the randomly chosen 20 white males, then X follows a binomial distribution with n = 20 and p = 0.08. Essentially, this question is asking for P(X = 2). Consider the remaining options. (B) is the right answer.

B: 10



Good job! We need to find P(X = 2) where X is binomial with n = 20 and p = 0.08.

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 $P(X = 2) = \frac{20!}{2!(20-2)!}*(0.08)^2*(1-0.08)^{18} = (calculations...) = 0.271$ C:OX This is not guite right. From the previous guestion, you know that if X is a random variable representing the number of color-blind white males out of the randomly chosen 20 white males, then X follows a binomial distribution with n = 20 and p = 0.08. Essentially, this question is asking for P(X = 2). Consider the remaining options. (B) is the right answer. D:0X This is not quite right. From the previous question, you know that if X is a random variable representing the number of color-blind white males out of the randomly chosen 20 white males, then X follows a binomial distribution with n = 20 and p = 0.08. Essentially, this question is asking for P(X = 2). Consider the remaining options. (B) is the right answer.

E:0

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